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Estimating Costs Of Improving Adirondack Timber Stands By Killing Culls With Frills And Sodium Arsenite

Although it has been known for many years that sodium arsenite solution applied in ax frills is an effective means of killing cull trees (1), no published information could be found on the cost of stand-improvement work with this method under Adirondack conditions.

Since 1951 sodium arsenite solution has been used in frills to improve timber stands on the Paul Smith Experimental Forest. These were natural mixed stands, varying from old growth to stands recently cut, and typical of conditions in this region. The trees treated were unmerchantable hardwoods.

The method used for this work consisted of an application of sodium arsenite solution to an ax frill. The frill consisted of a single line of overlapping ax cuts, encircling the tree and extending slightly into the sapwood. When the arsenite solution (28-40 percent) was applied during the sap-peeling season, trees generally died within a short time; this treatment also caused bark to peel within 1 year (2).

The crew generally consisted of two axmen and one other man to apply the poison. Trees 6 inches d.b.h. and larger were frilled, but smaller trees received single ax cuts spaced about 4 inches apart around the tree. Each axman selected and tallied the trees he frilled.

Costs, in terms of man-hours and quantity of poison, may be estimated on the basis of average size and number of trees treated per acre, or on the basis of basal area treated per acre (table 1). These relationships may be useful to others in making preliminary estimates of the cost of doing similar stand-improvement work. Actual costs on similar operations will vary depending upon crew experience and efficiency, amount of slash and underbrush, terrain, and

Table 1.—Details of timber stand improvement work with frill and sodium arsenite solution

Compartment no.	Area treated	Average d.b.h. of trees treated	Minimum d.b.h. treated	Trees treated (per acre)	Basal area treated (per acre)	Labor (per acre)	Poison[1] used (per acre)
	Acres	Inches	Inches	No.	Sq. ft.	Man-hrs.	Gallons
14	30	6.4	1.0	94	25	4.12	—
35	46	5.5	1.0	132	32	4.50	—
31	48	10.4	5.0	42	28	3.78	—
4	44	9.0	5.0	83	41	3.92	0.32
25	27	10.5	5.0	25	18	2.09	—
30	27	12.4	9.0	7	6	.97	.06
49	50	6.1	1.0	106	29	2.49	.25
50	34	5.7	1.0	93	25	2.56	.24
19	30	8.5	5.0	63	27	2.84	.29

[1]Data given only for battery-filler syringe application.

whether trees to be treated have been marked or must be selected by the axmen.

Labor Cost

An estimate of the man-hours of labor required for timber-stand improvement work may be obtained from the regression formula (fig. 1):

$$\text{Man-hours per acre}^{1} = \begin{pmatrix}\text{Average}\\ \text{d.b.h.}\end{pmatrix}\begin{pmatrix}\text{No. trees}\\ \text{treated}\\ \text{per acre}\end{pmatrix}(0.0043) + 0.9$$

In terms of basal area (a somewhat less consistent measure), the average production rate was approximately $8\frac{1}{2}$ square feet per man-hour. The range was from 6.1 to 11.8 square feet.

Amount Of Poison Used

The sodium arsenite solution was applied to the frills either with a paintbrush or with a battery filler syringe fitted with a metal tip (1/16-inch orifice). The latter is preferred, since it markedly reduces the hazards resulting from spillage and spattering, and also requires considerably less poison.

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[1]"Man-hours" includes all time spent on the work area except the lunch period. It does not include travel time to and from the area.

In using the battery-filler syringe, the quantity of sodium arsenite solution required per acre may be estimated from the regression formula:

$$\text{Gallons per acre} = \left(\begin{matrix}\text{Average}\\ \text{d.b.h.}\end{matrix}\right)\left(\begin{matrix}\text{No. trees}\\ \text{treated}\\ \text{per acre}\end{matrix}\right) \quad (0.0005)$$

In terms of basal area, 1 gallon was sufficient to treat an average of 110 square feet, with a range of 90 to 125 square feet.

Because sodium arsenite is poisonous to man and animals, reasonable care must be taken in using it. The safety precautions followed at the Adirondack Research Center have been outlined in a previous publication by Rushmore (2).

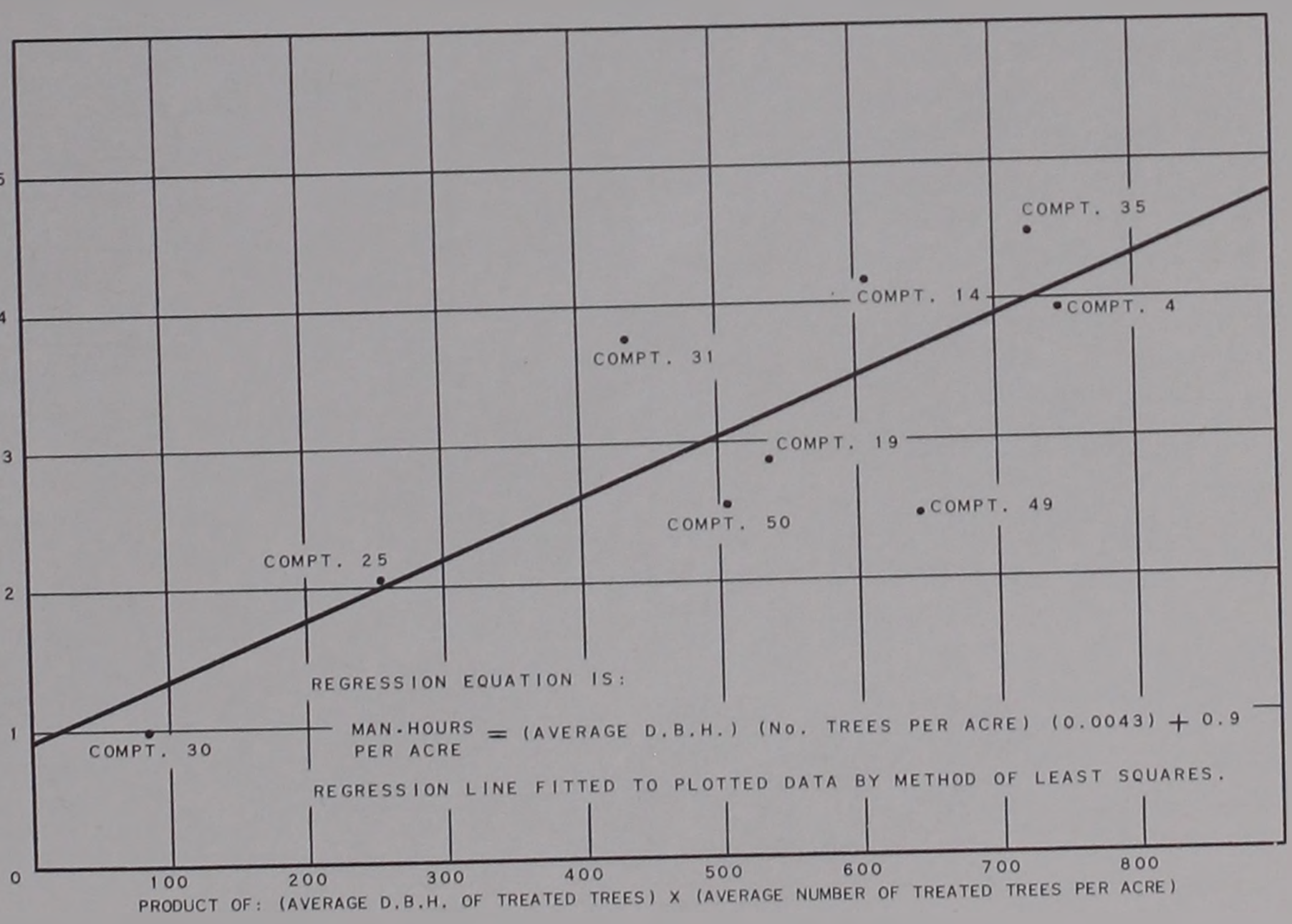

Figure 1.--Curve for estimating labor requirement for killing cull trees with frills and sodium arsenite. Plotted points are actual man-hour requirements, by compartments. The standard error of estimate is $\pm$ 0.72 man-hours.

Literature Cited

(1) MacKinney, A. L., and Korstian, C. F.
1932. Felling, girdling, and poisoning undesirable trees in forest stands. Jour. Forestry 30: 169-177.

(2) Rushmore, Francis M.
1956. The frill: a new technique in chemical debarking. Jour. Forestry 54: 329-331.

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